

Zebra Mussel Monitoring



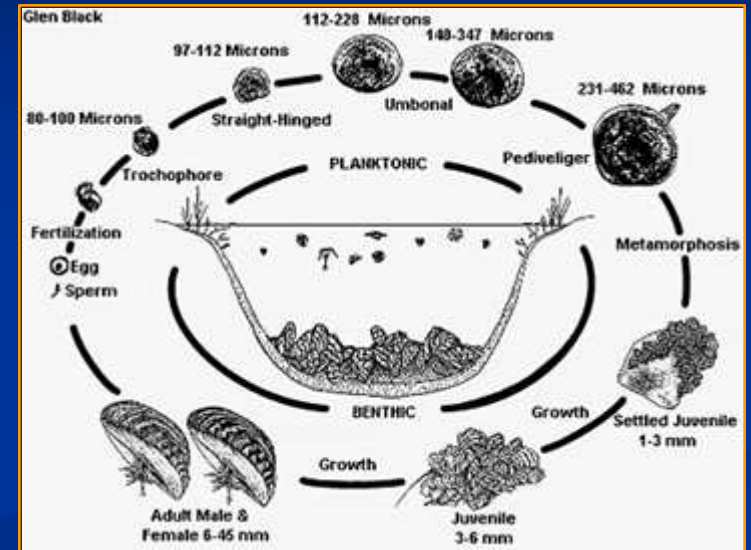
WHAT ARE ZEBRA MUSSELS?



- Triangular-shaped with zebra striping
- Cousins to the clams
- 2 inches or smaller

Biology & Life Cycle

- External fertilization
- ~40,000 eggs in a reproductive cycle, 1 million per spawning season
- Larvae emerge after 5 days, free swimming for a month, attach to substrate w/ byssus
- Life-span 3-9 yrs, sexually mature at 8-9 mm
- Can disperse in all life stages



Ohio Sea Grant

WHY ARE ZEBRA MUSSELS A PROBLEM?

- Alter food chain



WHY ARE ZEBRA MUSSELS A PROBLEM?

- Kill native mussels



Wisconsin Sea Grant

WHY ARE ZEBRA MUSSELS A PROBLEM? (cont.)



- Foul water intakes
- Damage engines

WHERE DID ZEBRA MUSSELS COME FROM?

- Originally from the Black, Caspian and Aral Seas in Eurasia
- Introduced into Lake St. Clair near Detroit, Michigan, by ballast water in the mid-1980s



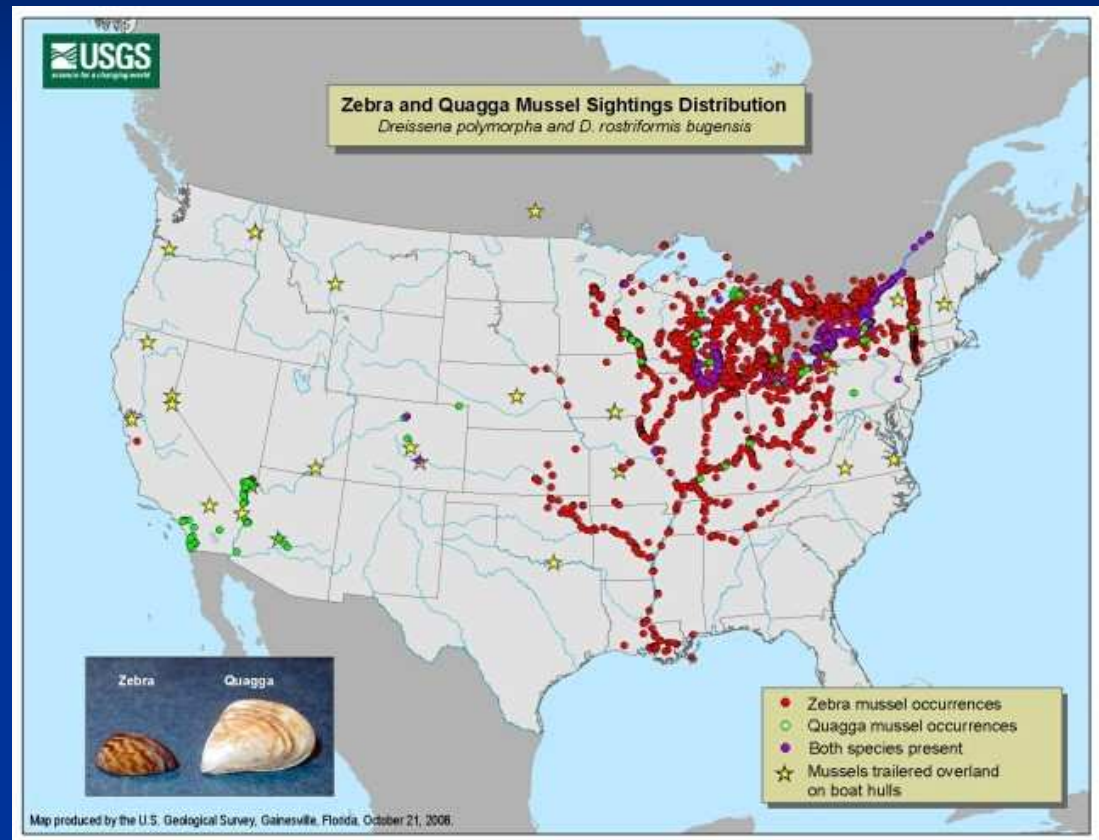
The spread of zebra mussels



Source: http://cars.er.usgs.gov/Nonindigenous_Species/ZM_Progression/zm_progression.html

CURRENT N.A. DISTRIBUTION

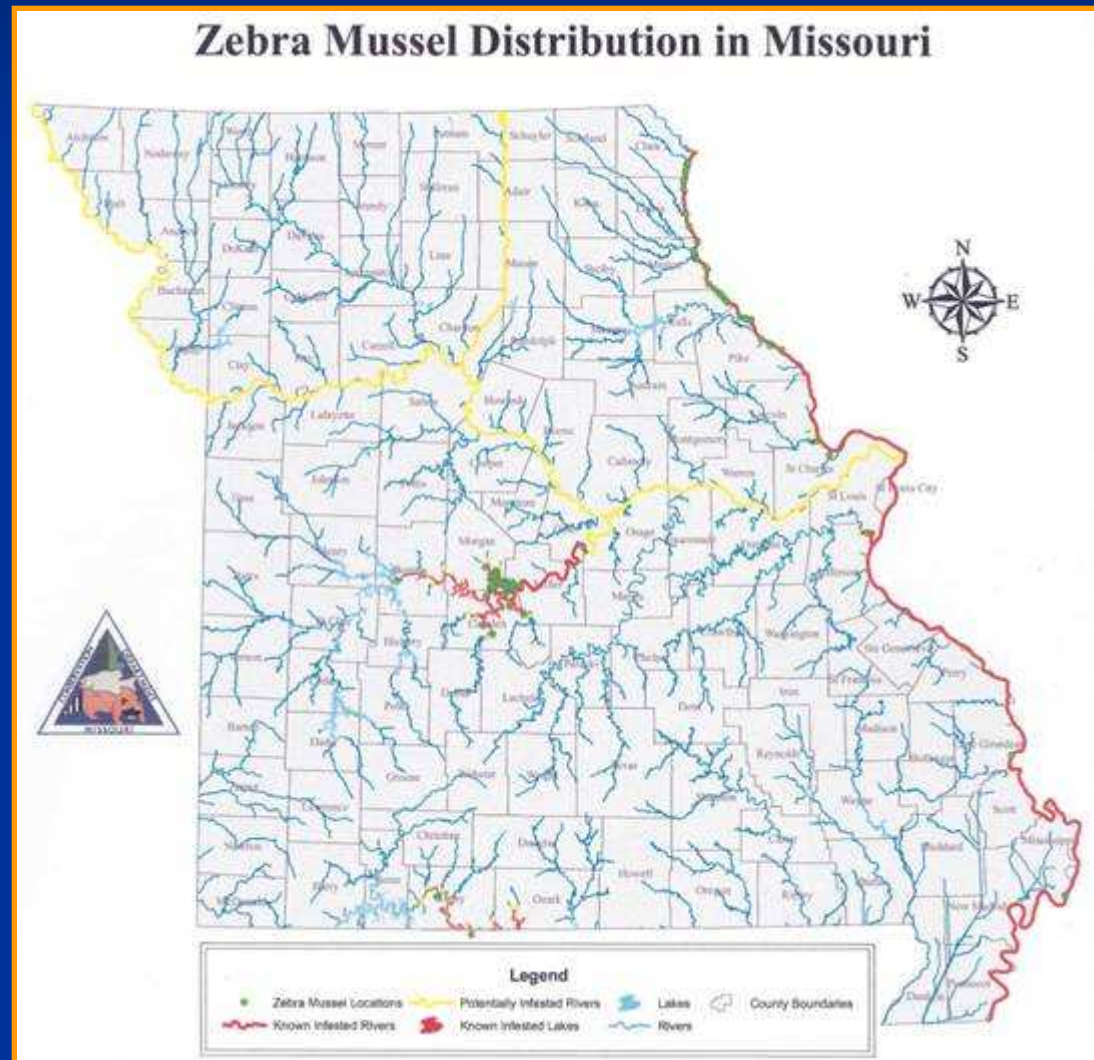
- In a number of interior lakes
- Almost every major trib to the Mississippi River



- Red dots represent confirmation or observations of adults, juveniles or veligers
- ★ Yellow stars represent the discovery of the overland transport of zebra mussels on trailered boats

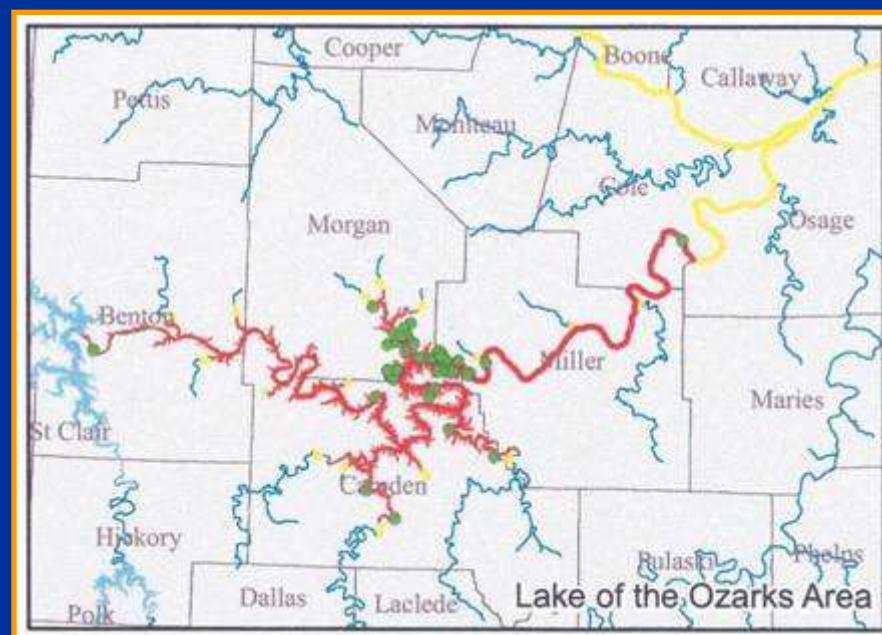
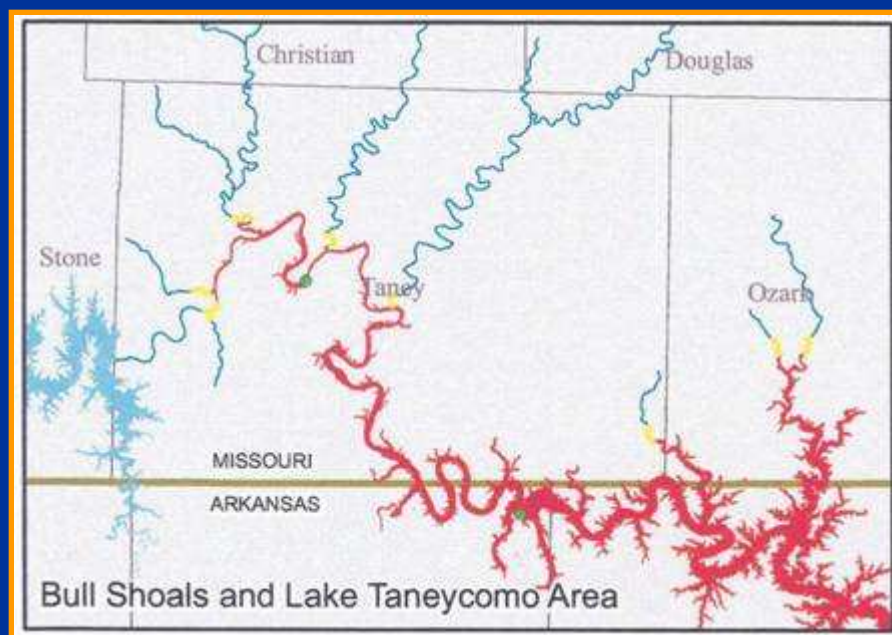
Missouri Distribution

www.mdc.mo.gov/nathis/exotic/zebra



Missouri Distribution

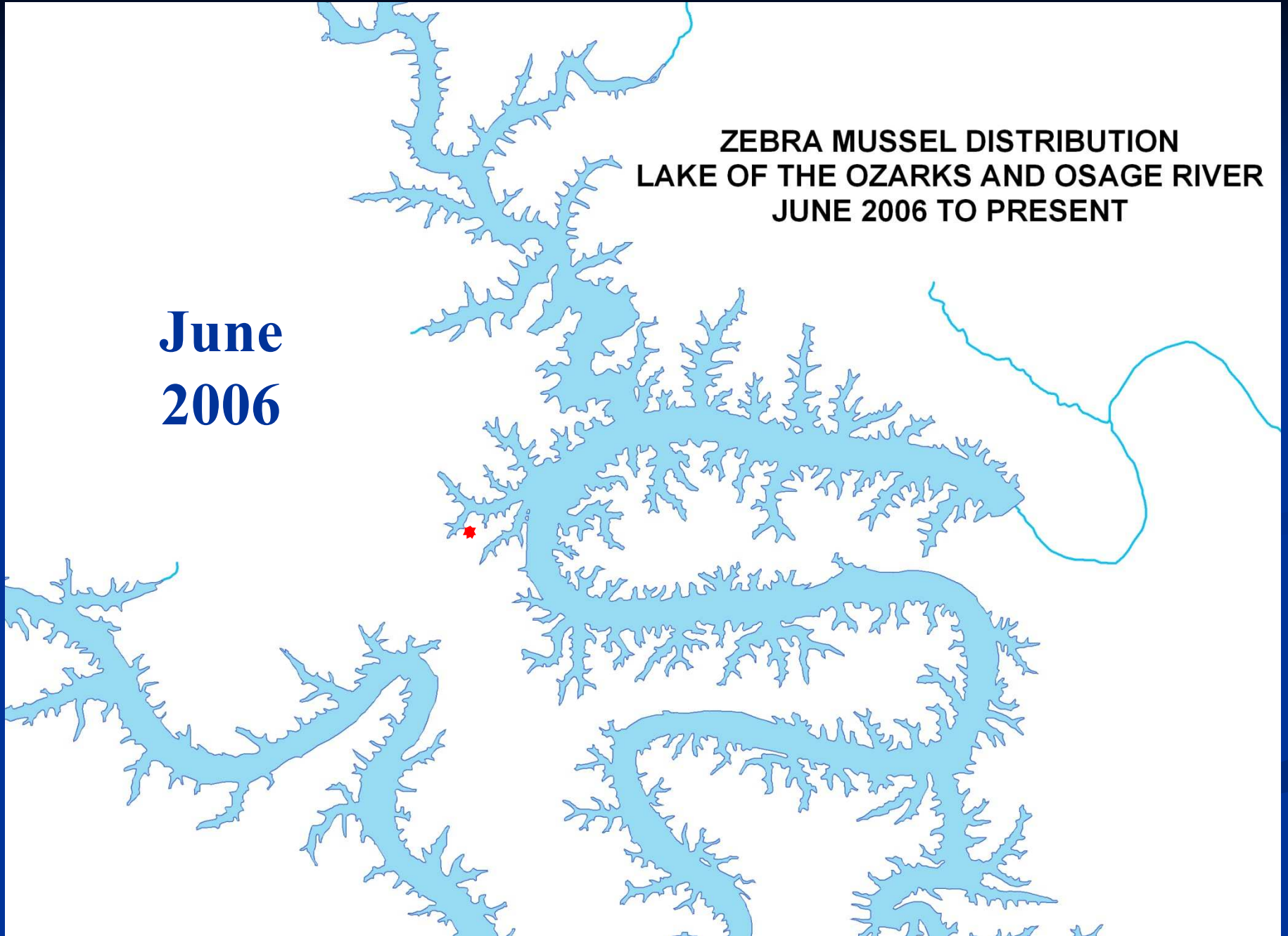
www.mdc.mo.gov/nathis/exotic/zebra



For more info contact the MDC Invasive Species Coordinator at
573/751-4115

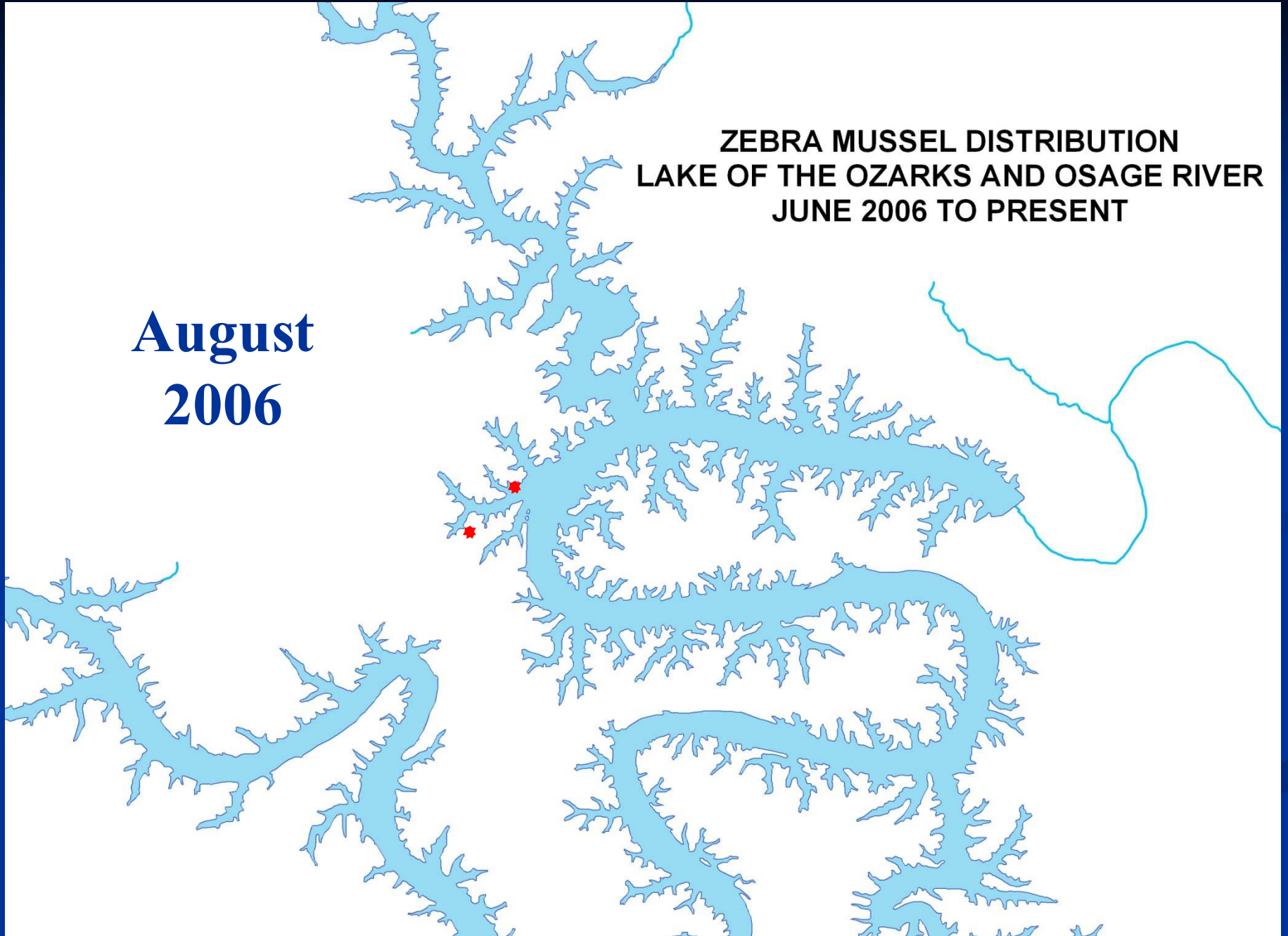
**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**June
2006**



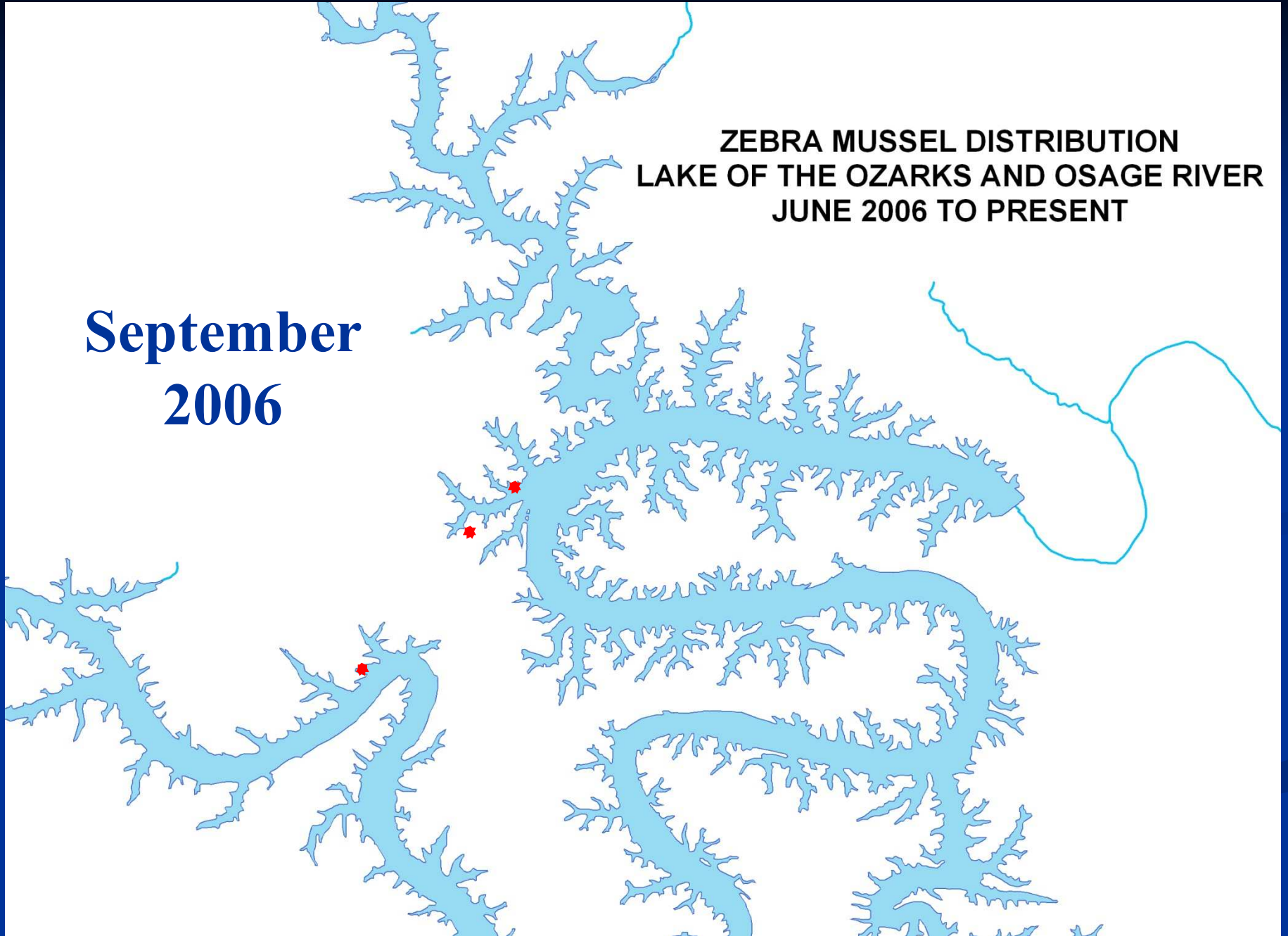
**ZEBRA MUSSEL DISTRIBUTION
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**August
2006**



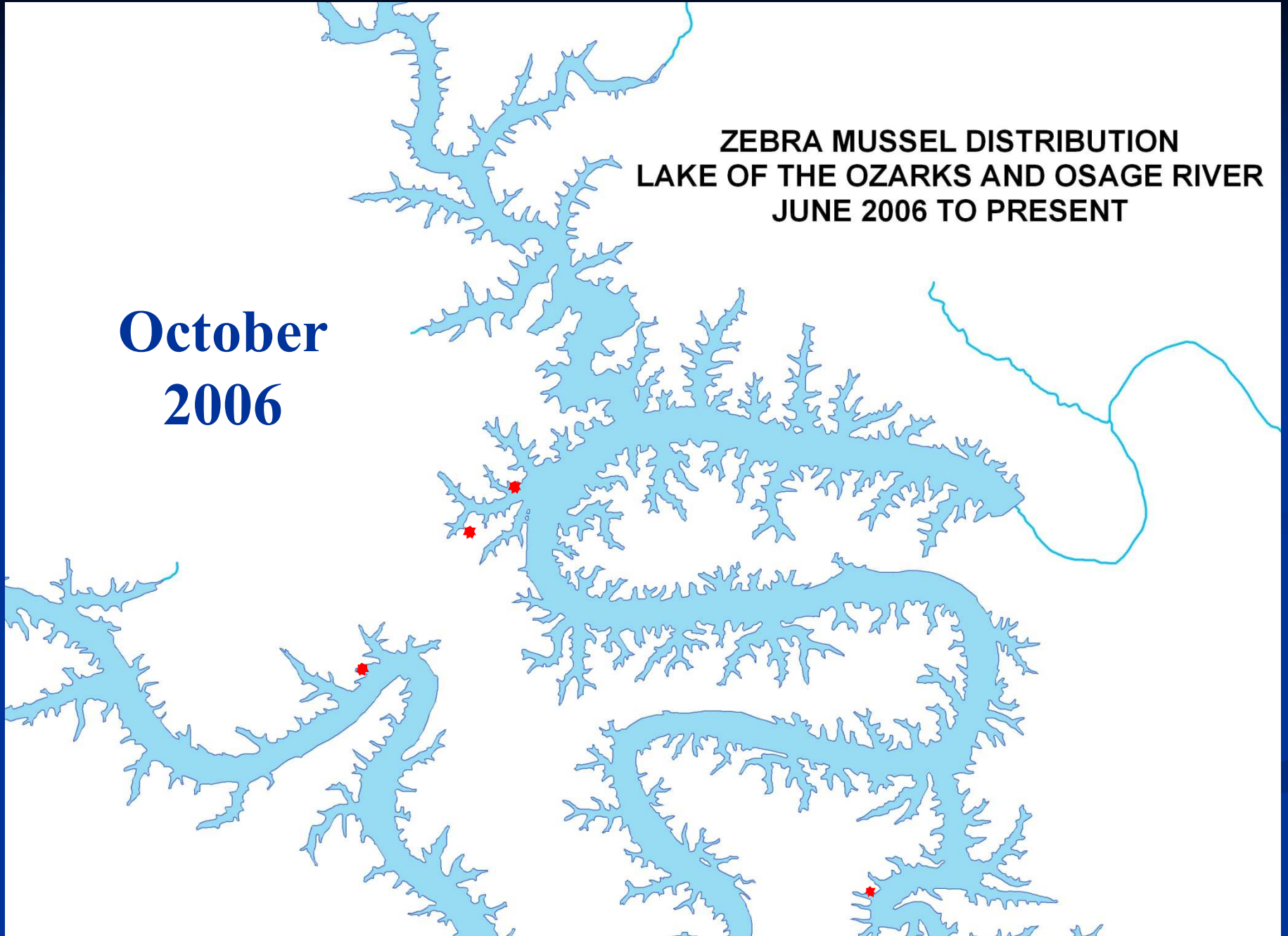
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**September
2006**



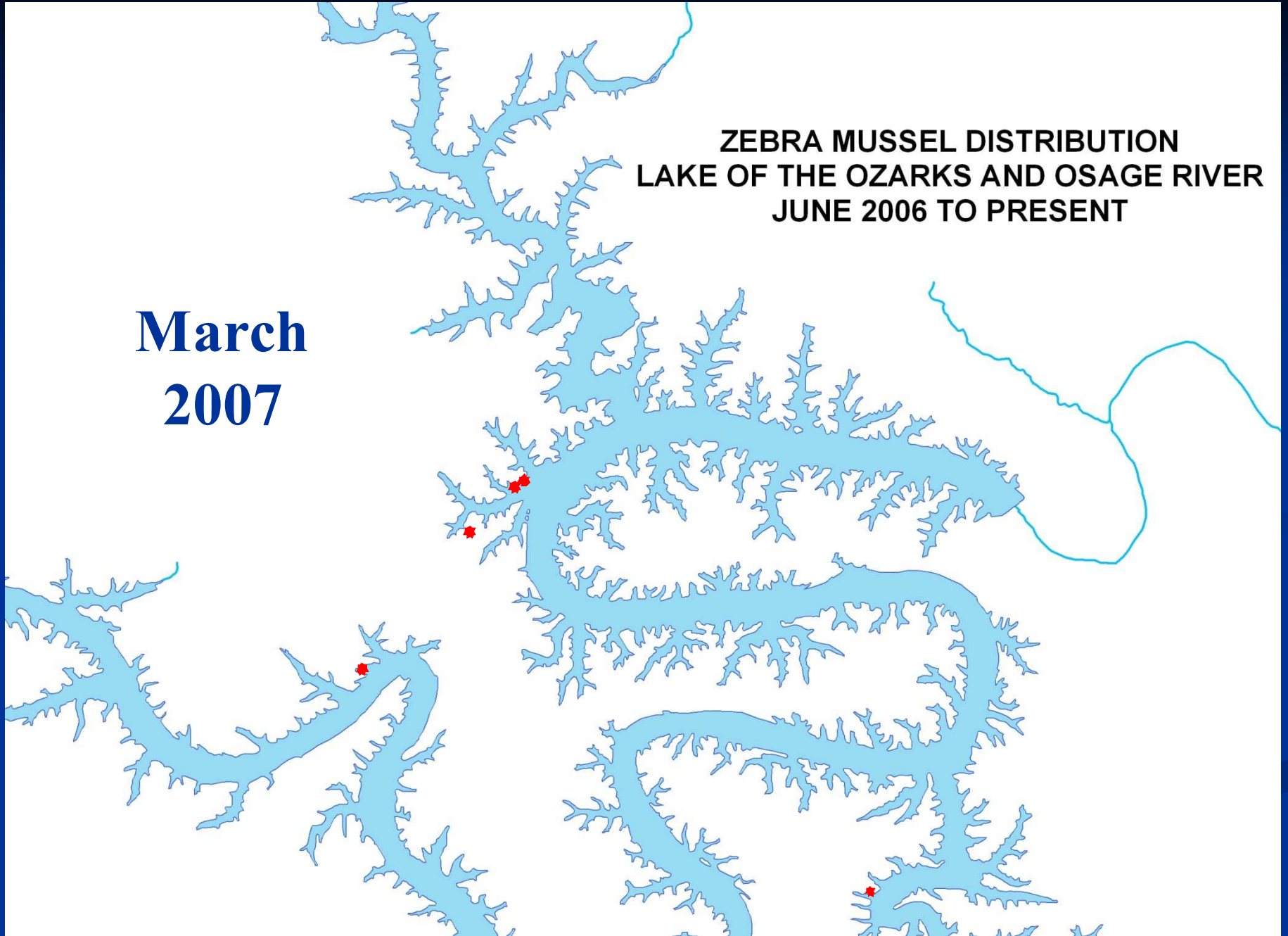
**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**October
2006**



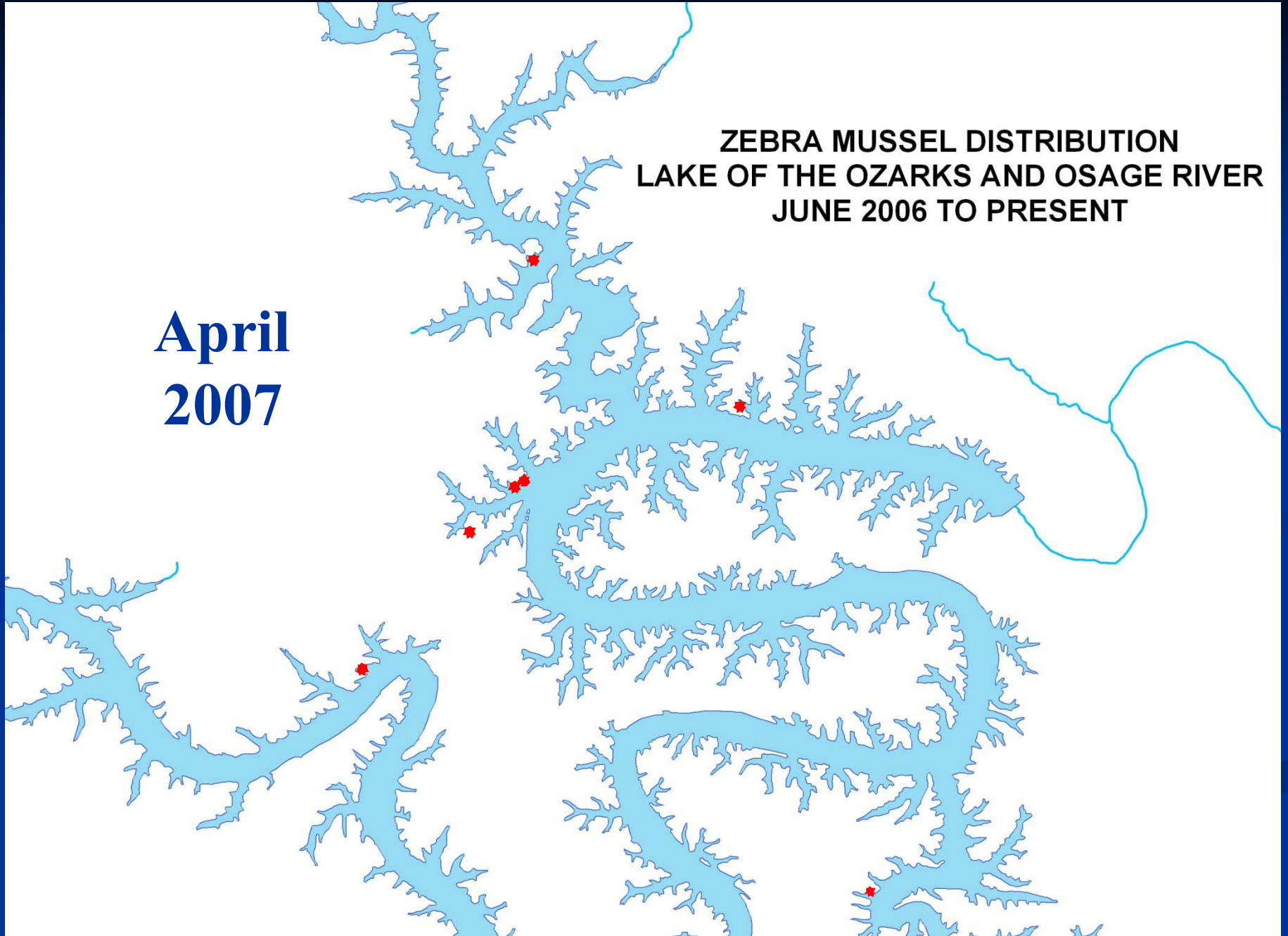
**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**March
2007**



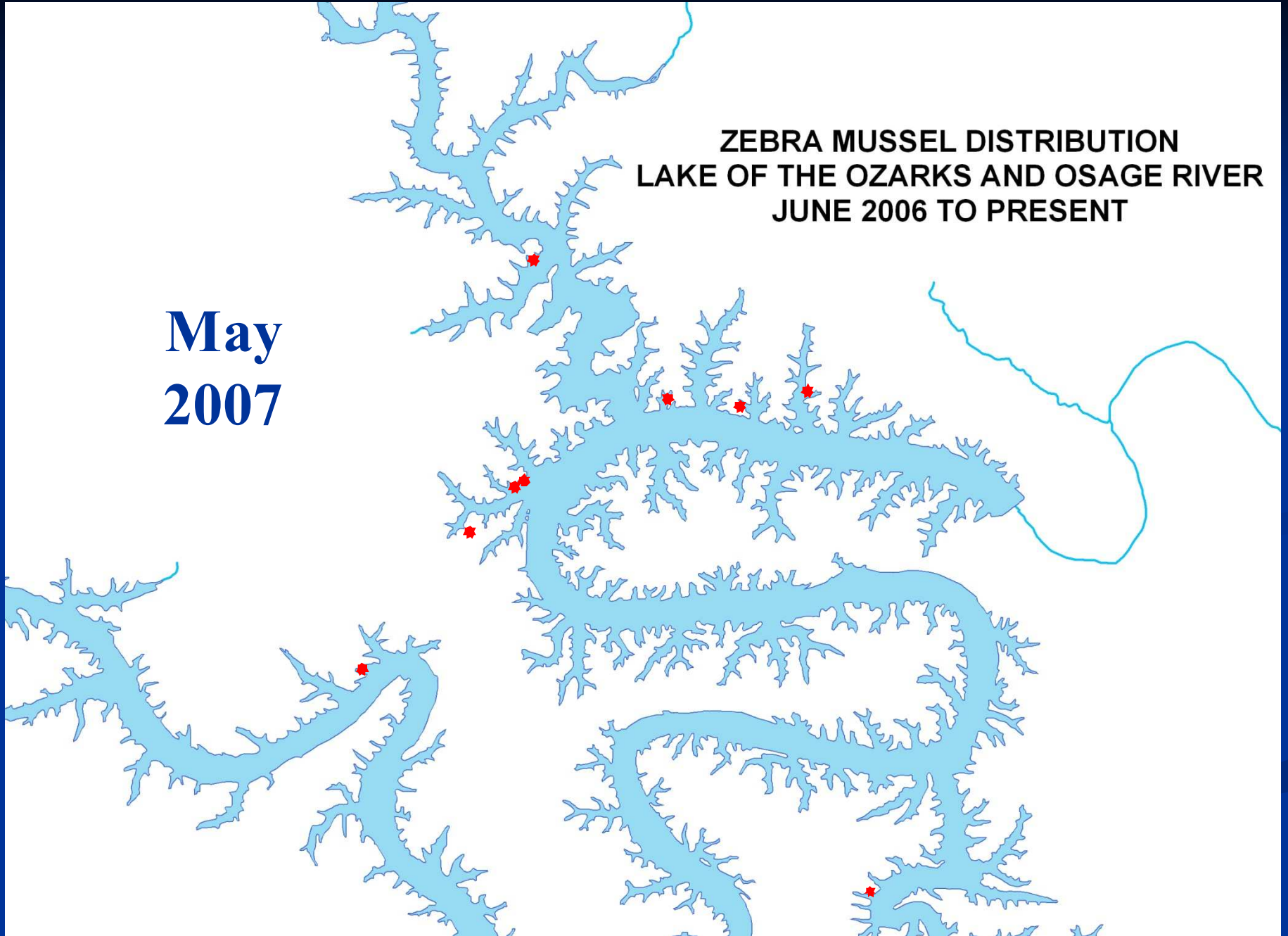
**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**April
2007**



**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**May
2007**



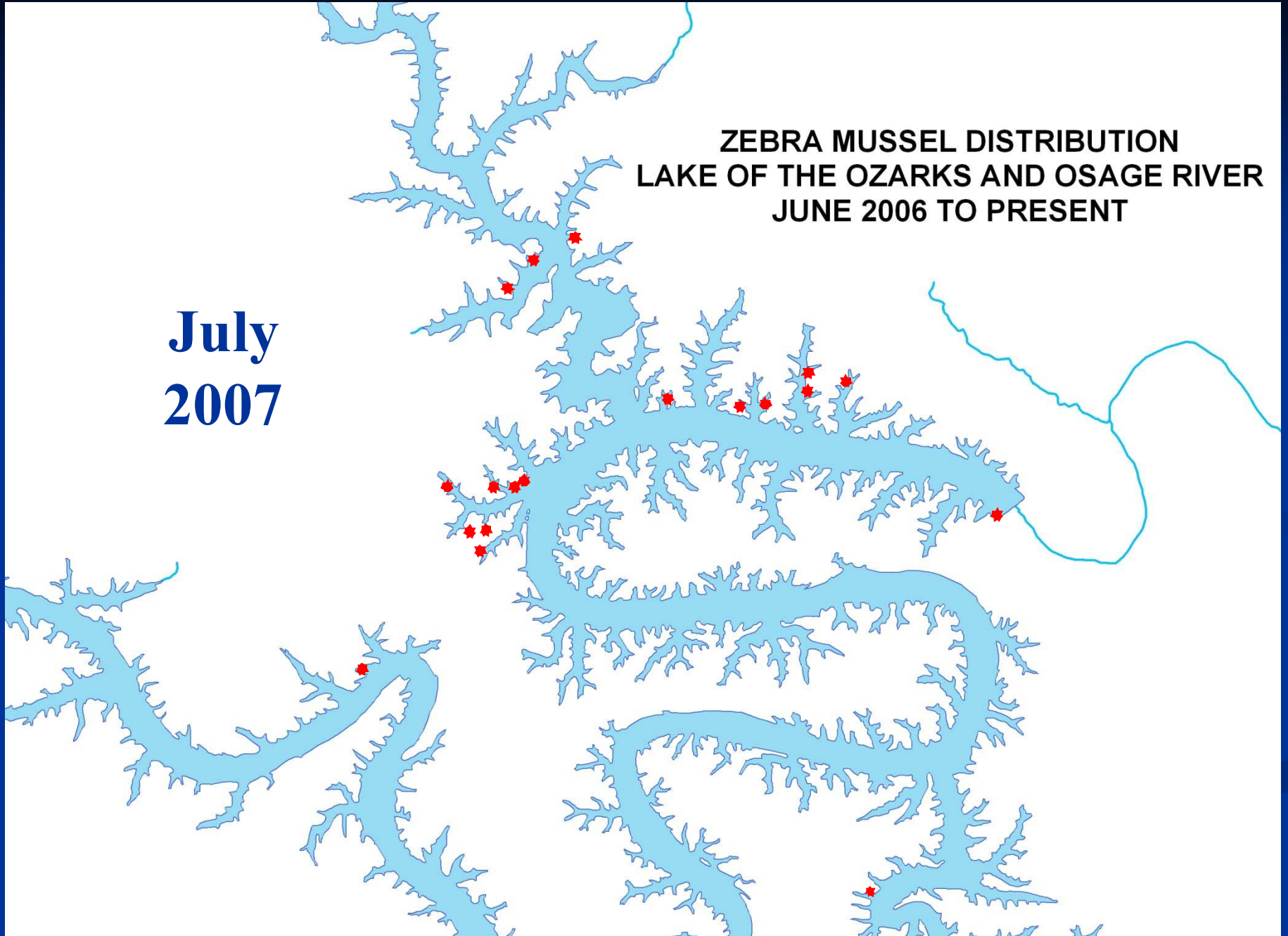
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JUNE 2006 TO PRESENT**

**June
2007**

June 2007

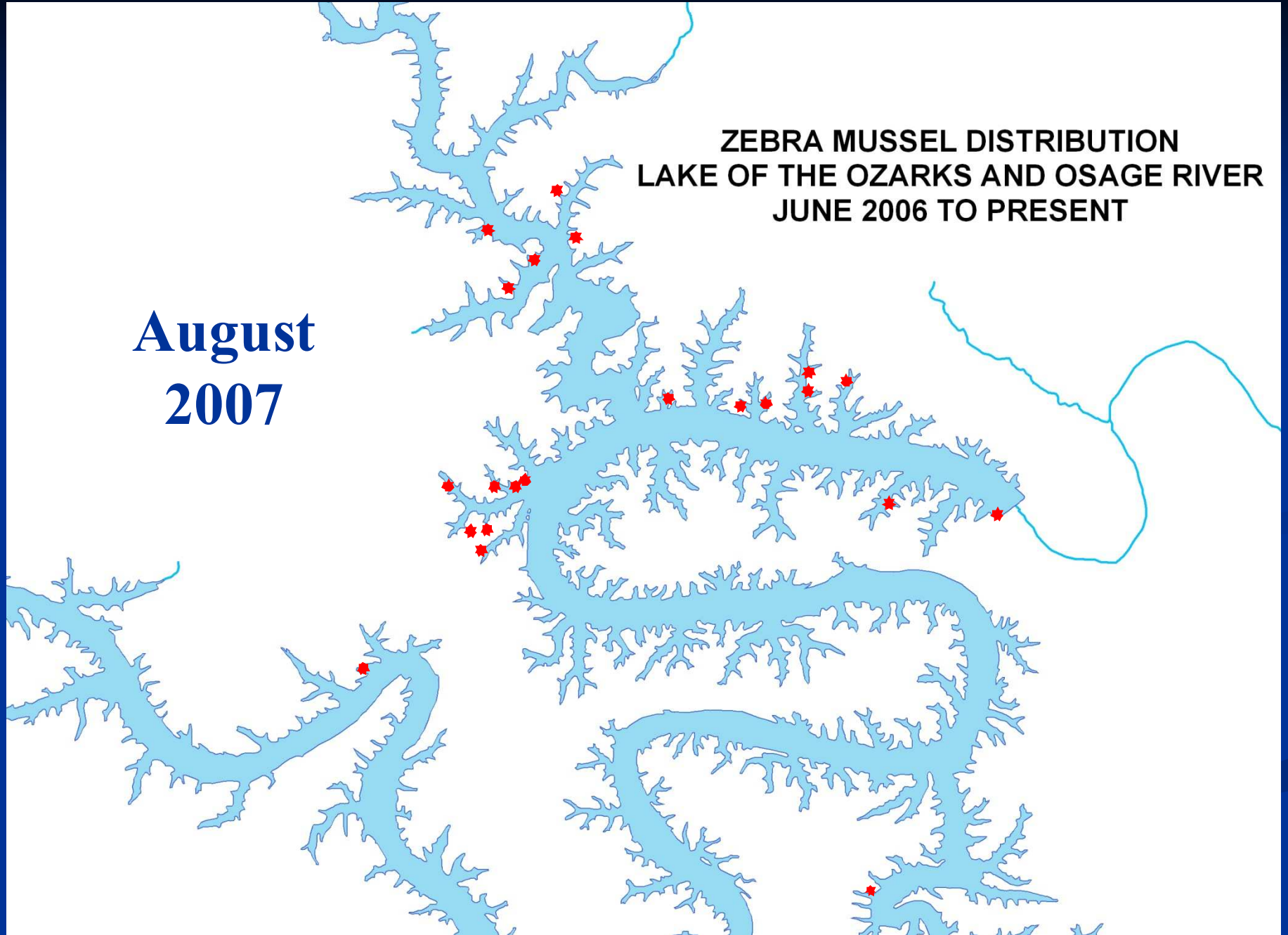
**ZEBRA MUSSEL DISTRIBUTION
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JUNE 2006 TO PRESENT**

**July
2007**



**ZEBRA MUSSEL DISTRIBUTION
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**August
2007**



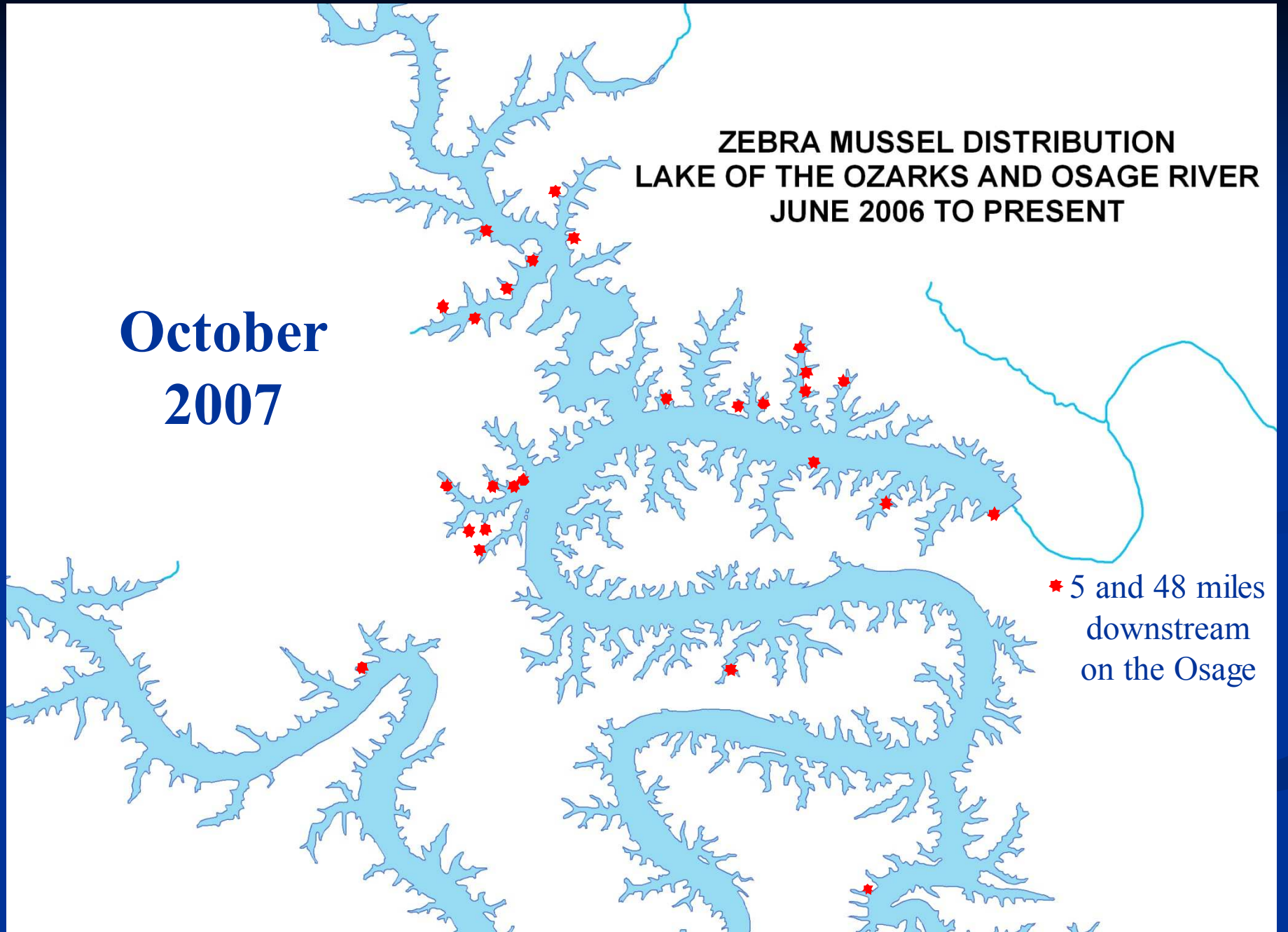
**September
2007**

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JUNE 2006 TO PRESENT**

September 2007

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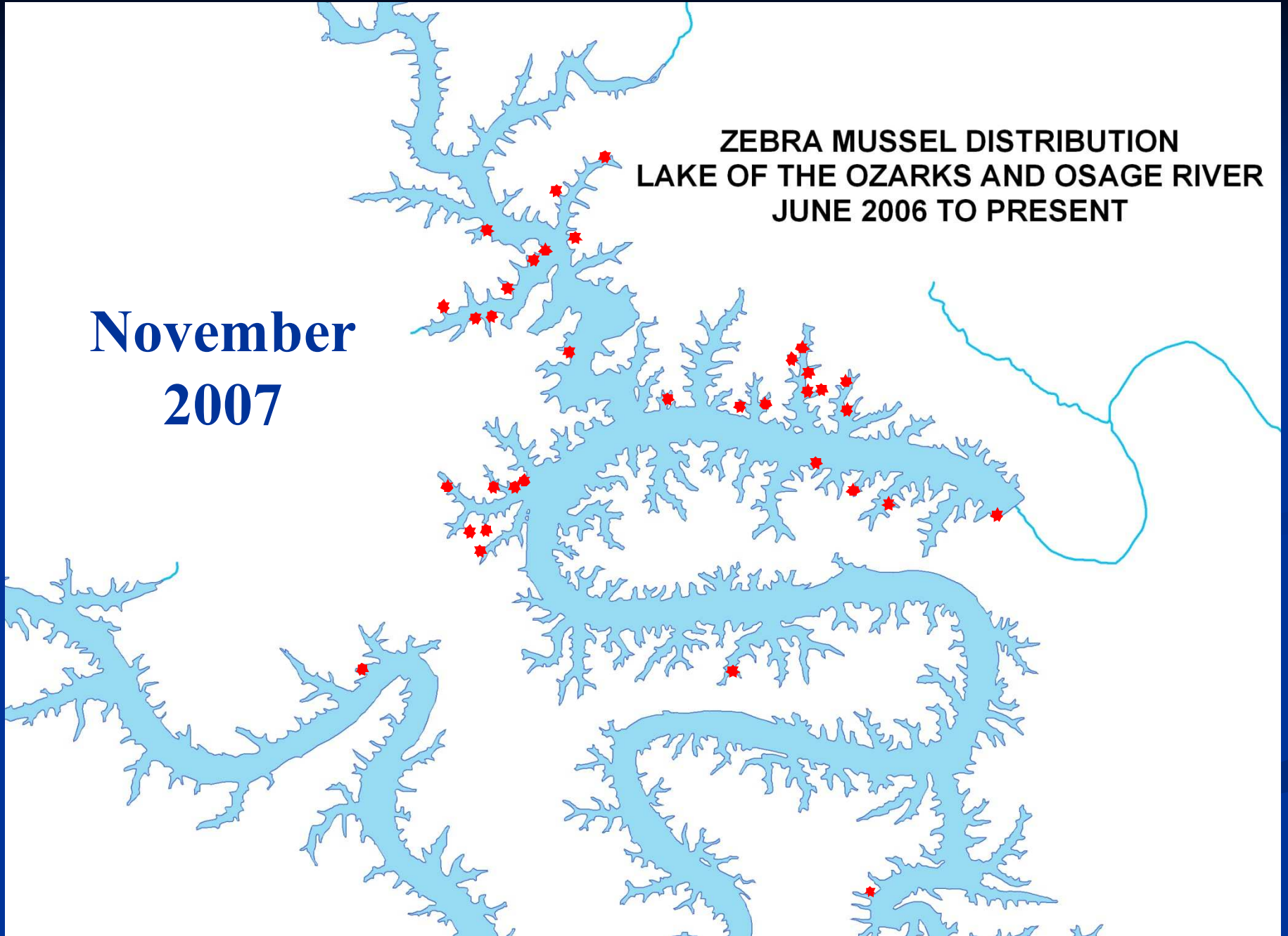
**October
2007**



★ 5 and 48 miles
downstream
on the Osage

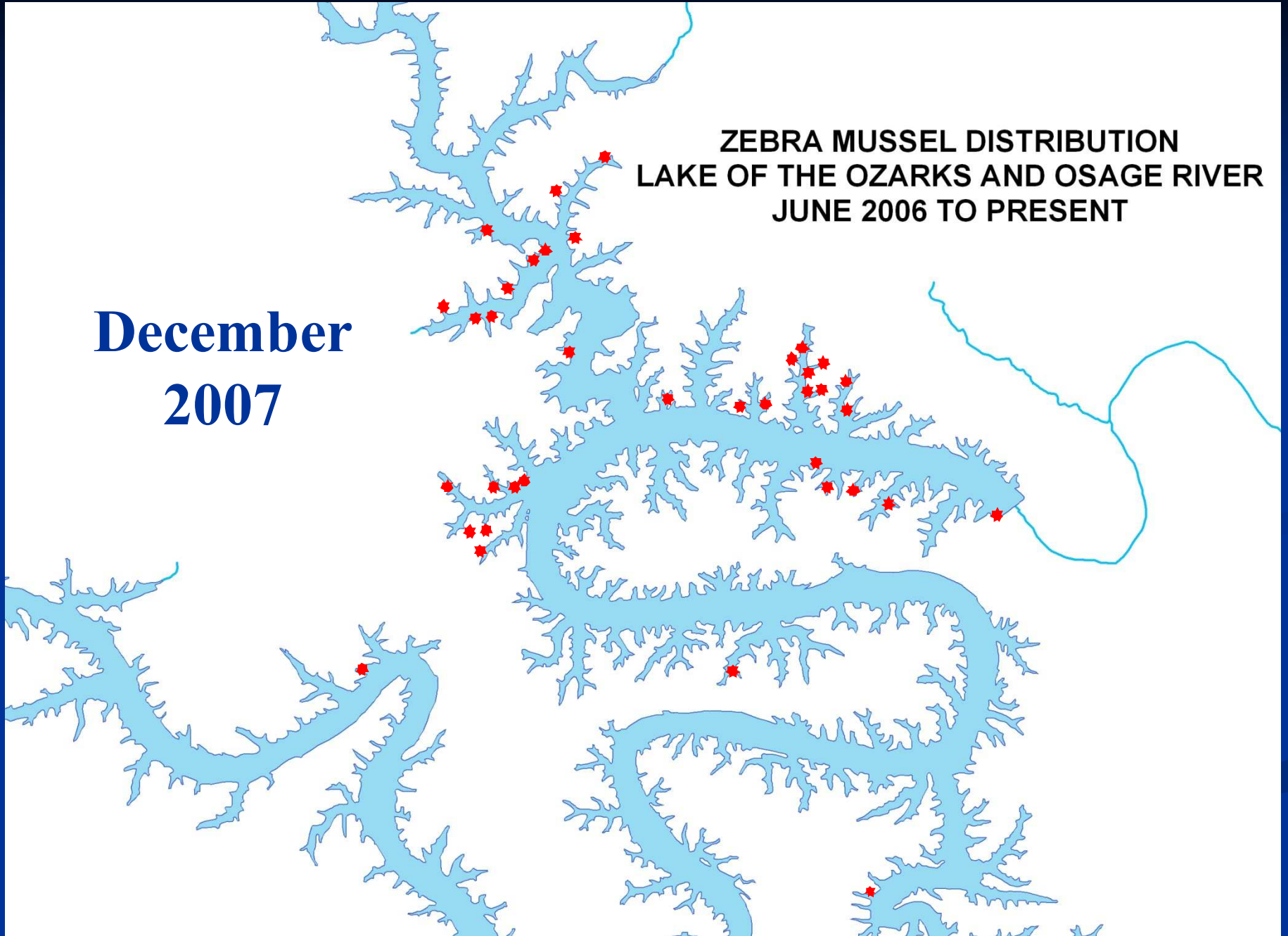
**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**November
2007**



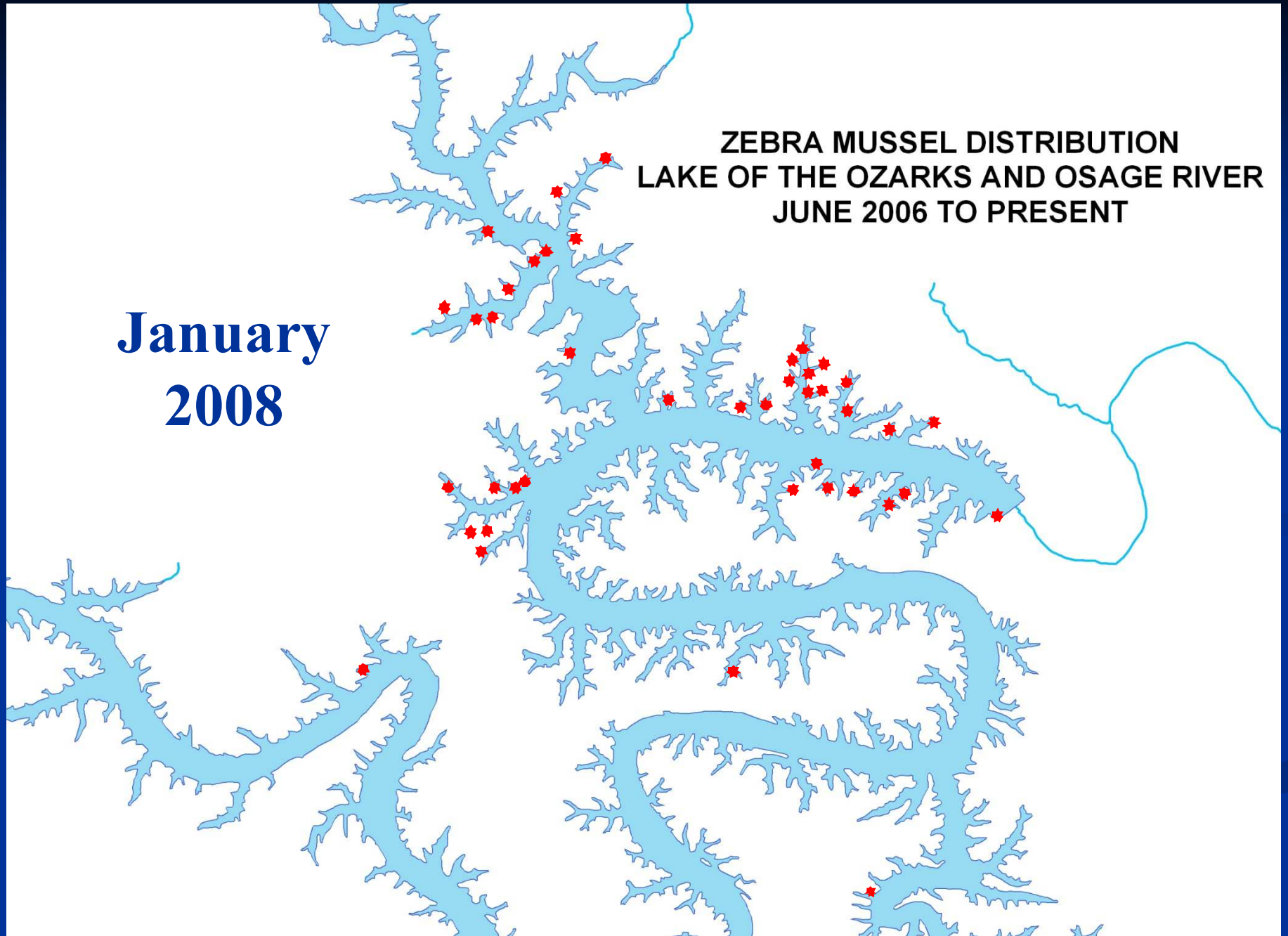
**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

**December
2007**



**ZEBRA MUSSEL DISTRIBUTION
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JUNE 2006 TO PRESENT**

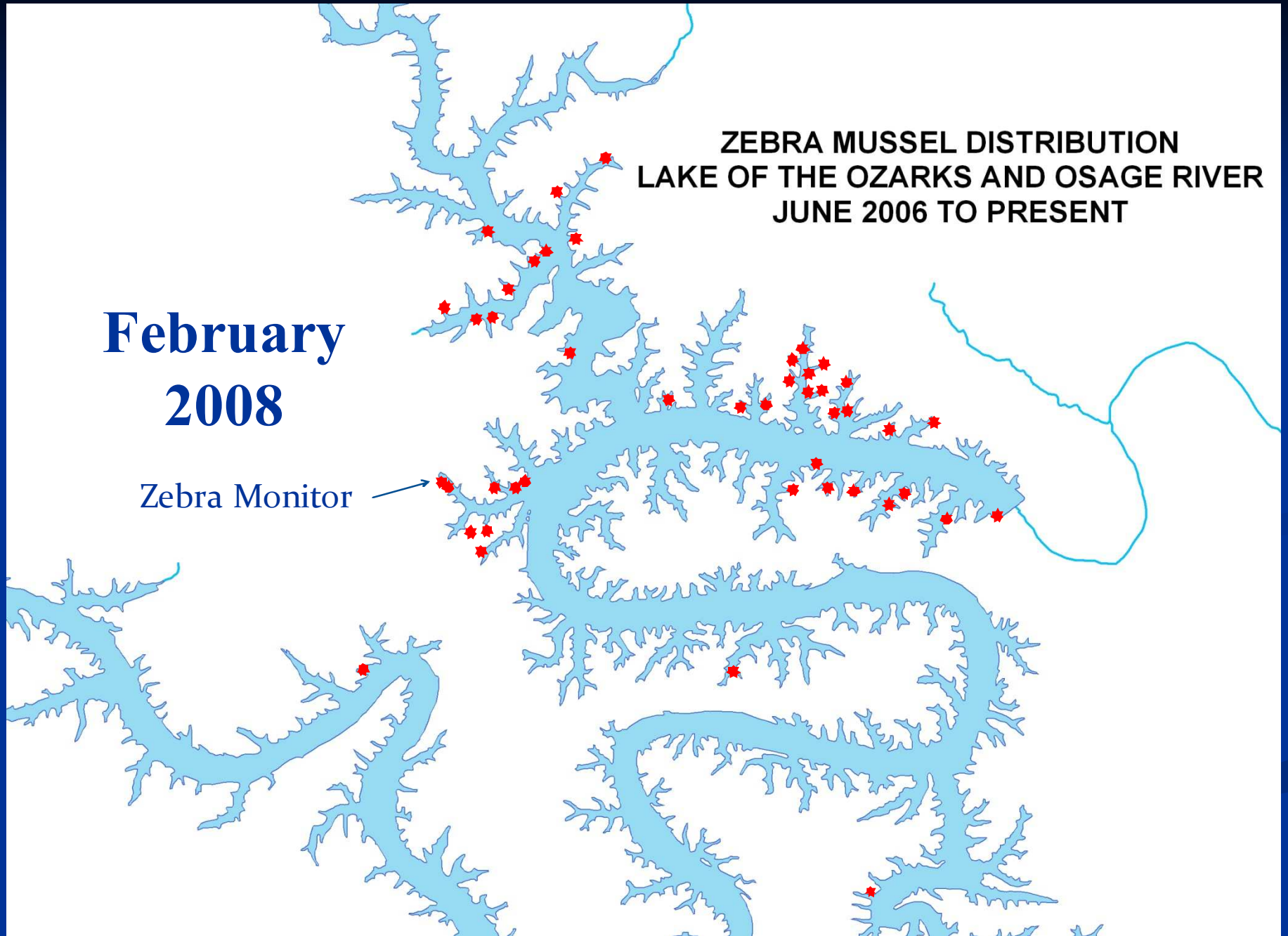
**January
2008**



**ZEBRA MUSSEL DISTRIBUTION
LAKE OF THE OZARKS AND OSAGE RIVER
JUNE 2006 TO PRESENT**

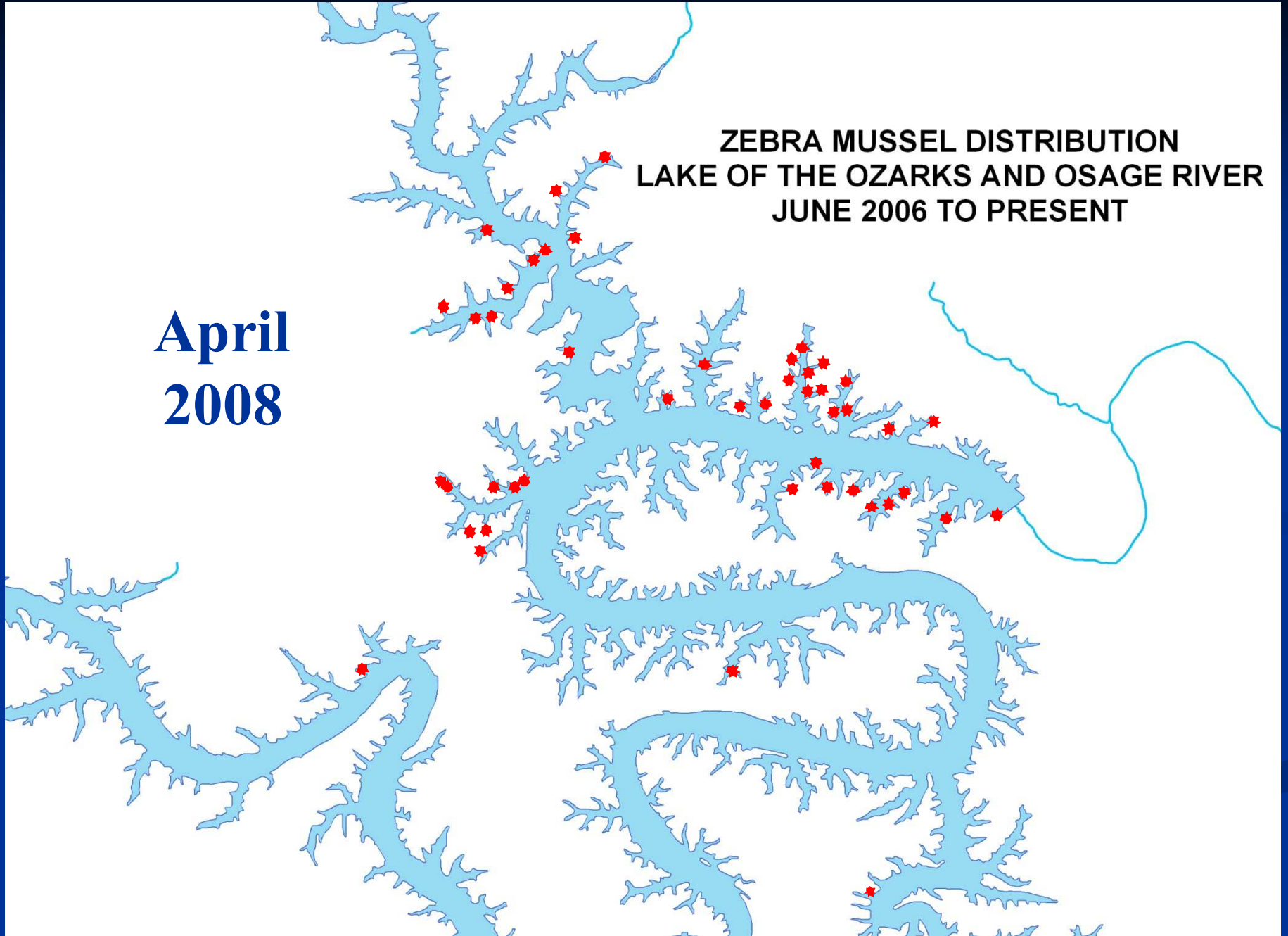
**February
2008**

Zebra Monitor



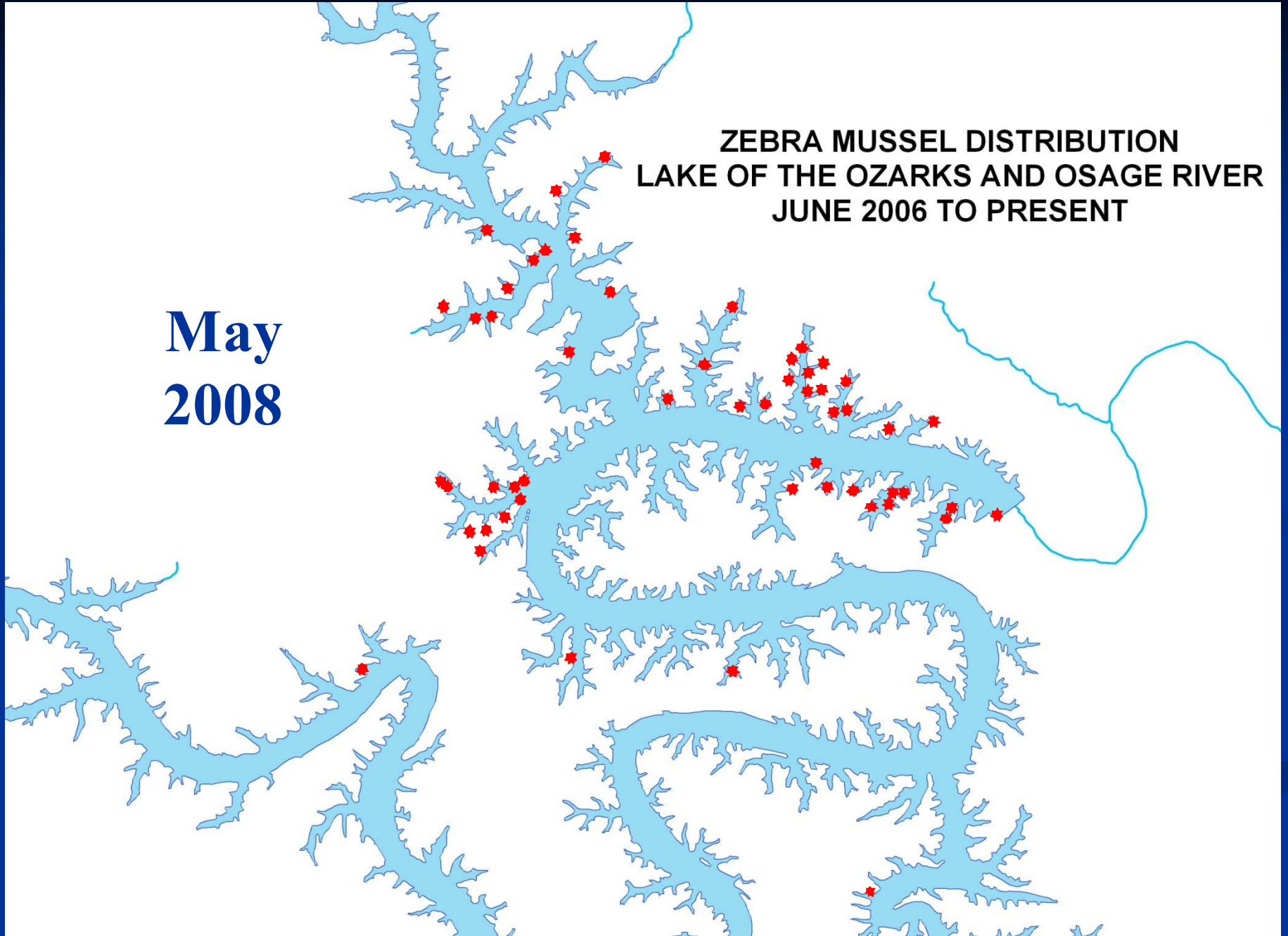
**ZEBRA MUSSEL DISTRIBUTION
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**April
2008**



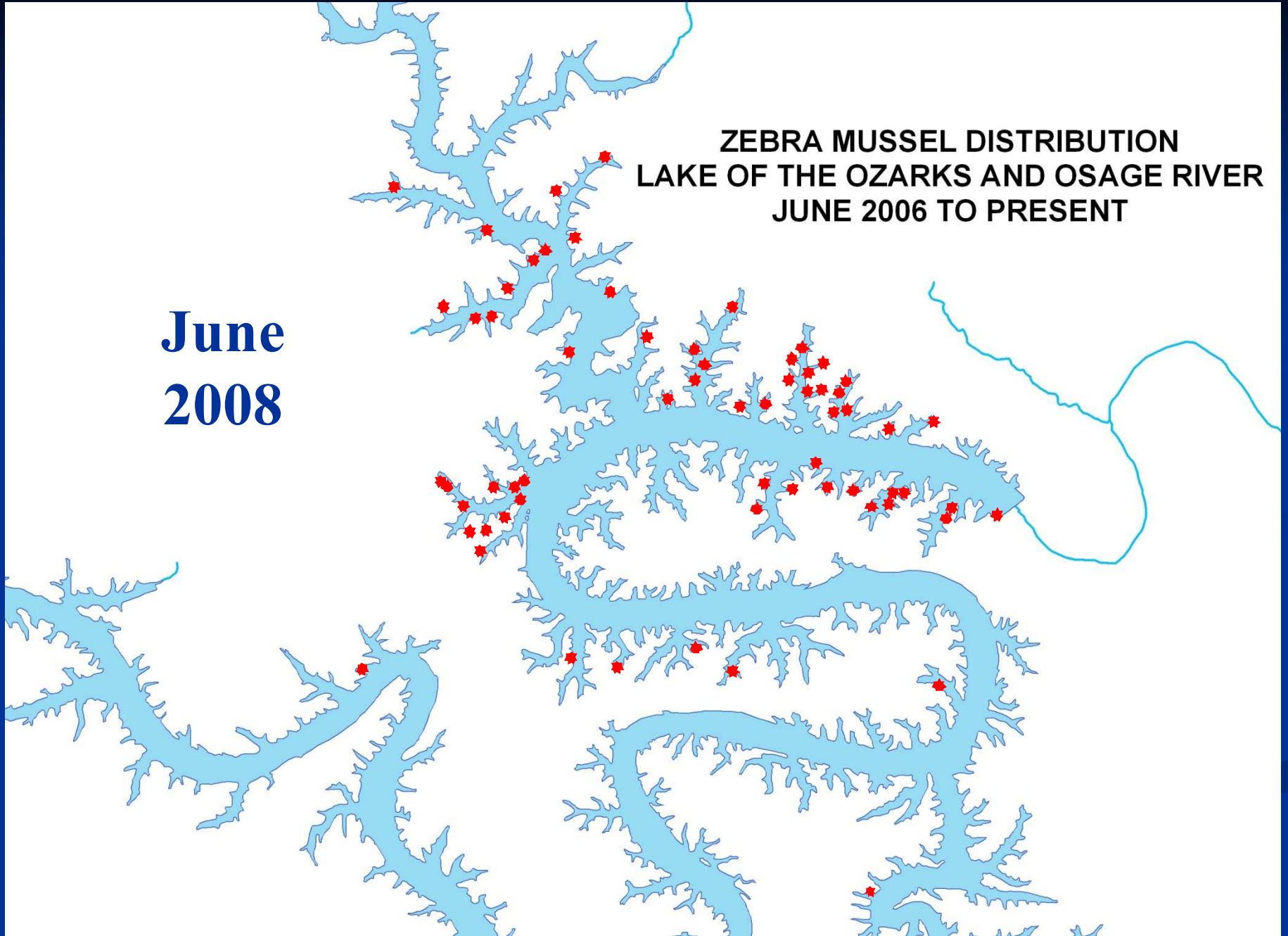
**ZEBRA MUSSEL DISTRIBUTION
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JUNE 2006 TO PRESENT**

**May
2008**



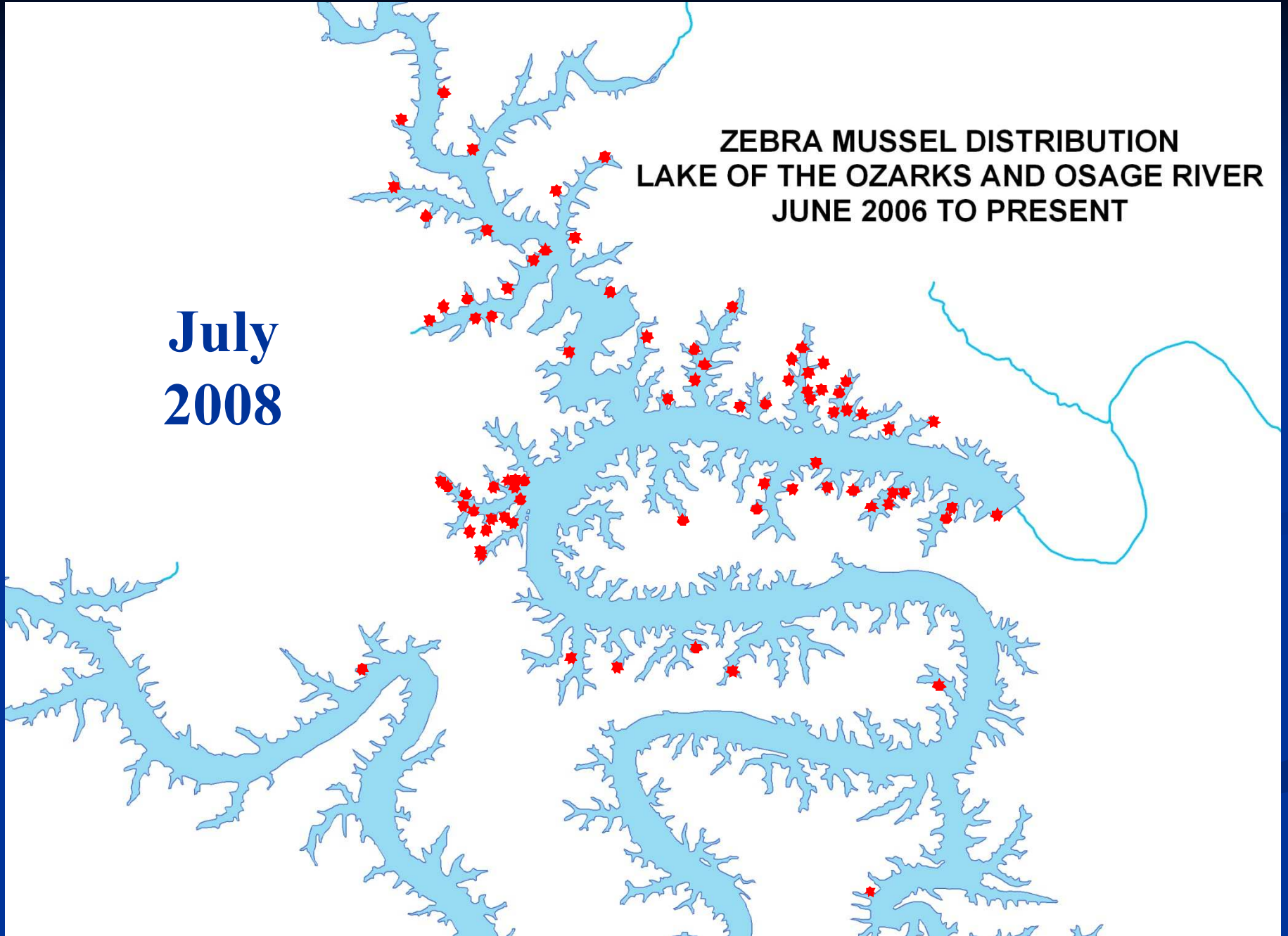
**ZEBRA MUSSEL DISTRIBUTION
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**June
2008**



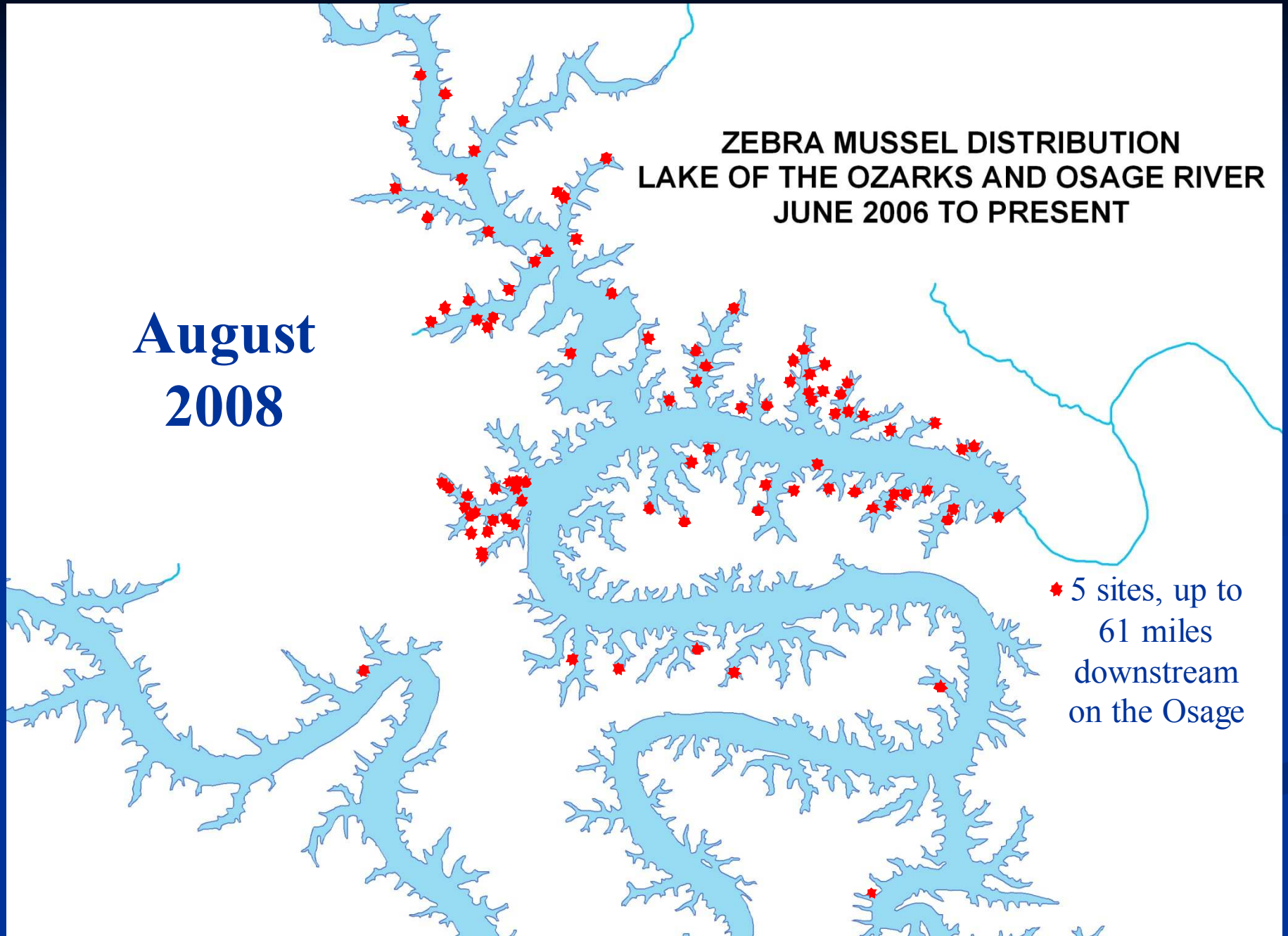
**ZEBRA MUSSEL DISTRIBUTION
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JUNE 2006 TO PRESENT**

**July
2008**



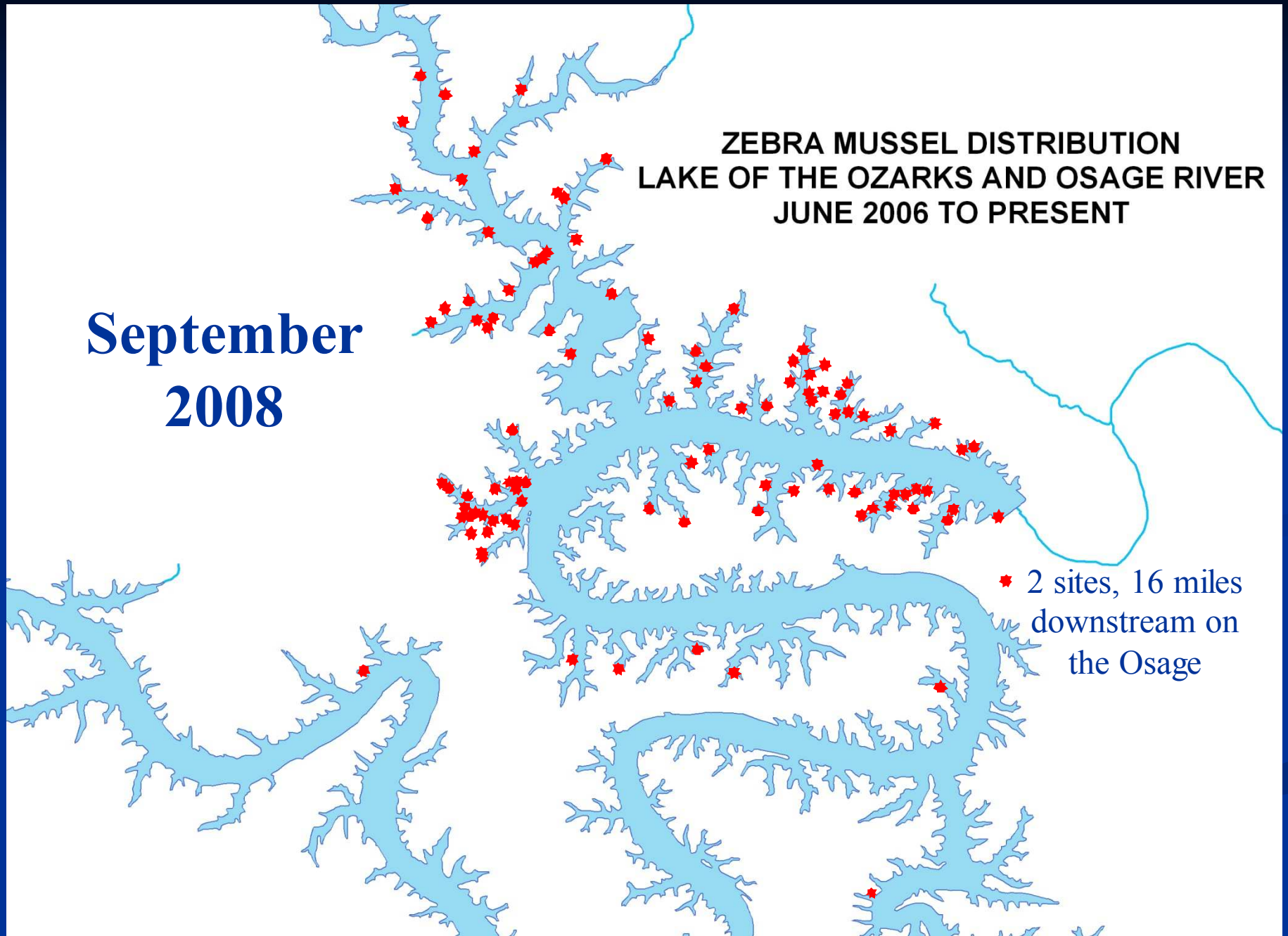
**ZEBRA MUSSEL DISTRIBUTION
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JUNE 2006 TO PRESENT**

**August
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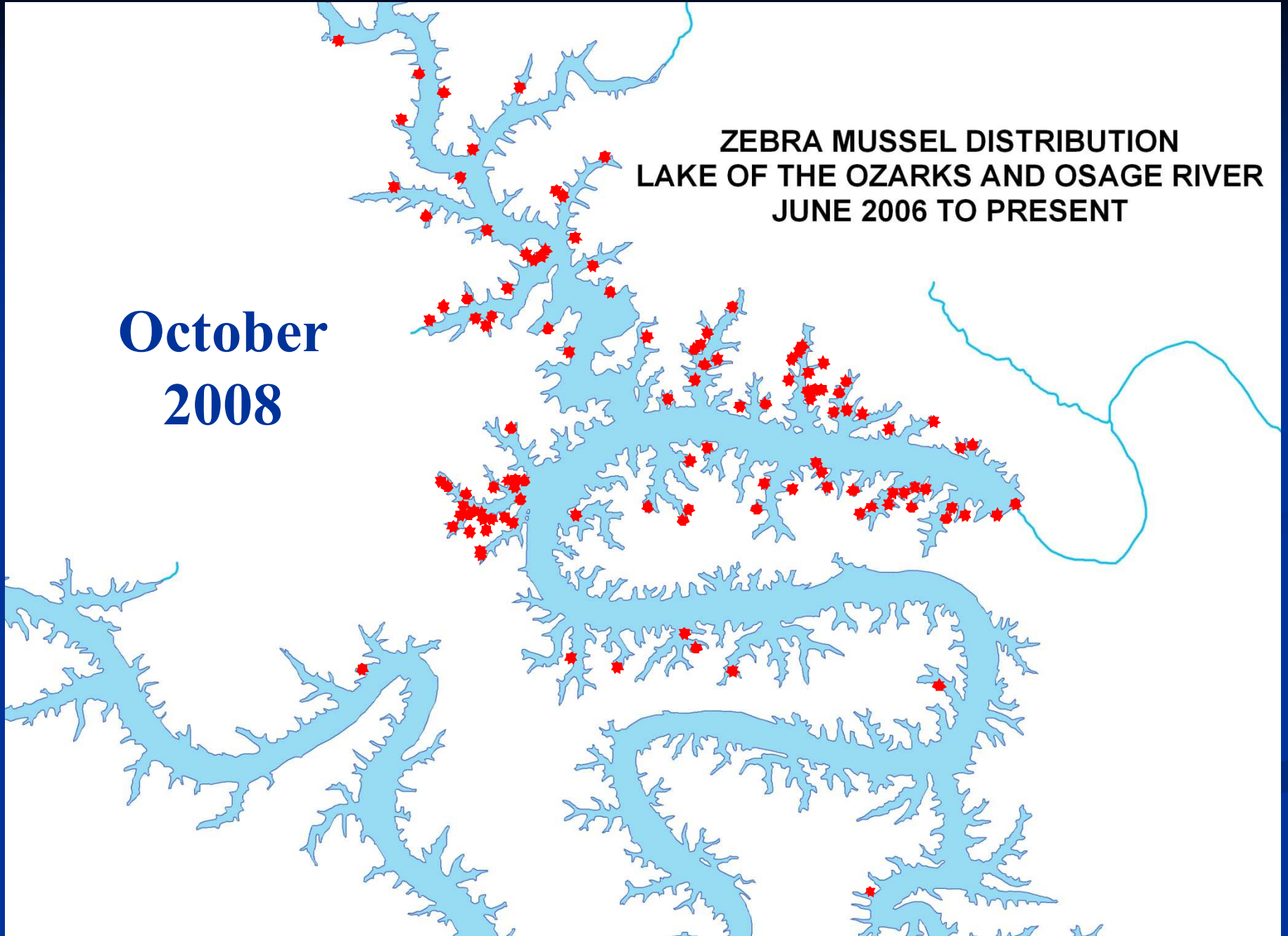
**September
2008**



★ 2 sites, 16 miles
downstream on
the Osage

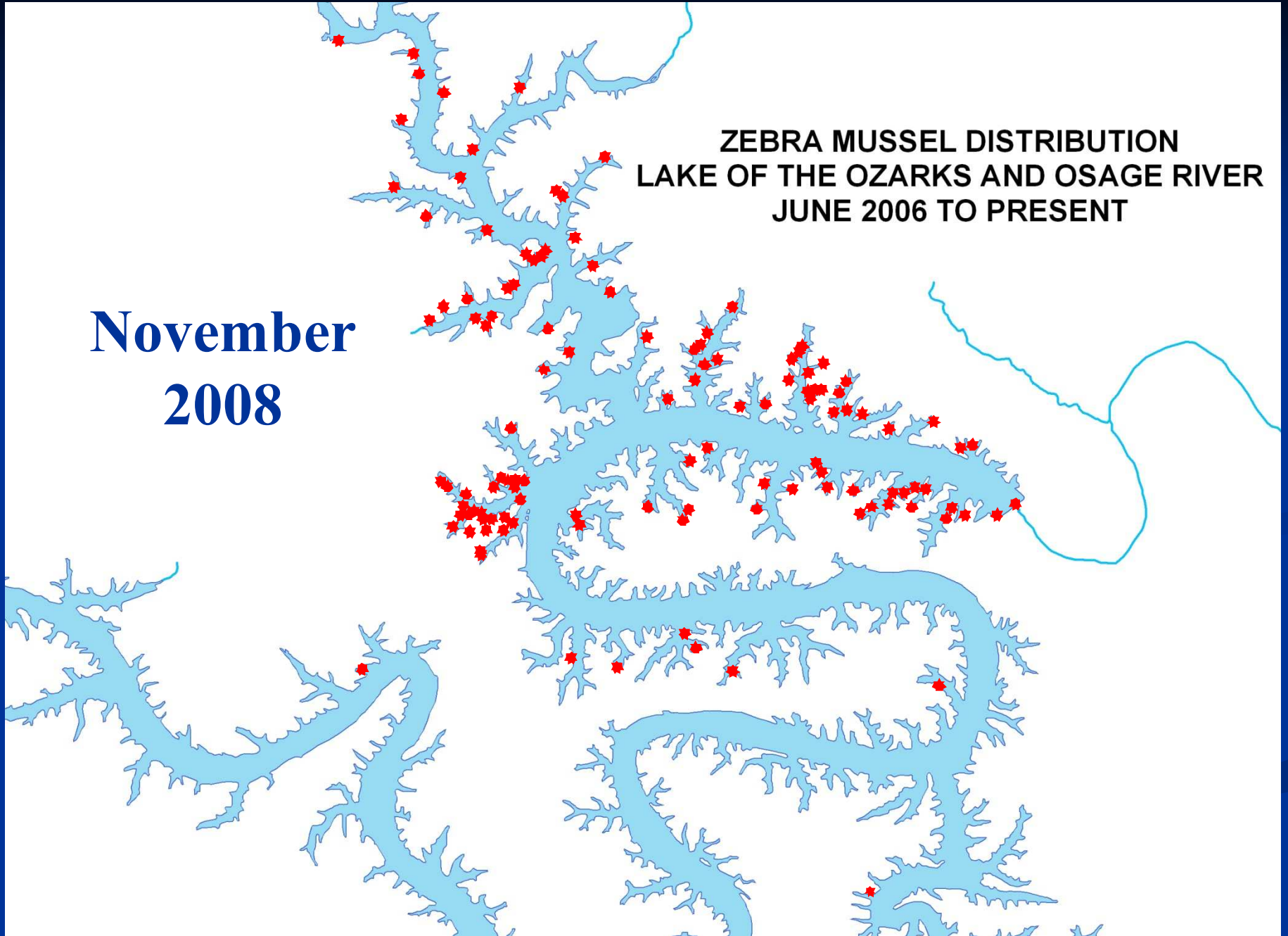
**ZEBRA MUSSEL DISTRIBUTION
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**October
2008**



**ZEBRA MUSSEL DISTRIBUTION
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2008**





ANS PREVENTION

Technique	Duration	Concentration	Solution (per gallon)	Comments
Vinegar	20 min	100%	1 gallon of vinegar, no water	Safety glasses and gloves should be worn. Vinegar and bleach are corrosive to metal and toxic to fish.
Chlorine	10 min	200 ppm	5 oz or 150 ml of bleach and 1 gallon of water	Before re-use rinse with water but don't let the solution runoff directly to the stream.
Air Drying	3-5 days	N/A	N/A	Equipment must dry completely.
Freezing < 32° F	24 hours	N/A	N/A	Must be below freezing for duration of contact time.
Salt Bath	24 hours	1%	1/8 cup and 1 gallon of water	Equipment must be completely submerged.

Zebra Mussel Monitoring

- Early detection is the key
- Your eyes - Missouri Stream Teams



Table Rock Lake

- 100th Meridian Initiative survey
(www.100thmeridian.org)
- Boats already launched in infested waters
- 6 of top 10 lakes have infestations
- Table Rock Lake was the 4th-most visited lake; highest without infestation



Implications

- Effects on diverse, native aquatic assemblages
- Industrial contamination
- Effects on recreation, possibly including fishing
- Infested Missouri lakes & rivers would augment westward expansion

Zebra Mussel Monitoring

➤ Where to look? On any hard surface

➤ Under rocks

➤ Docks

➤ In crevices

➤ Vegetation

➤ On woody debris

➤ In shallow water

➤ DO NOT LIKE LIGHT

Zebra Mussel Monitoring

Location?

Information needed from all over the state

☐ Presence

☐ Absence

➤ Popular float streams

➤ Large reservoirs

➤ Your monitoring site

➤ Your adopted stream



WHEN TO LOOK

- Warmer Months → April - October
 - Particularly during drought conditions
- How often to look
 - Monthly is ideal, but every 2-3 months is OK
- Remember to look:
 - Along edges of pools with slow current
 - Everything w/ a hard surface (even native mussels)

CONCRETE BLOCK COLLECTION METHOD



DATA

I FOUND ONE!

- WHO? WHEN? WHERE?
- Data reporting:
 - Voicemail: 800/781-1989
 - E-mail: streamteam@mdc.mo.gov
 - Fax: 573/526-0990
 - Online forms:
<http://www.mostreamteam.org>
- * Remember, early detection can help slow the spread of zebra mussels

**STREAM TEAM
ZEBRA MUSSEL MONITORING REPORT FORM**

Name _____

Stream Team # _____

Address _____

City, State, Zip _____

Day phone: _____ Evening phone: _____

Name(s) of monitor(s): _____

Date of sample _____ County: _____

Stream name _____

Location of Monitoring Site [Please be specific; give legal description (Section, Township, Range) or describe proximity to roads/highways/towns (e.g., where Hwy. H crosses Spring Creek in southwest Mussel County): _____

Sampling Method (please check):

☐ Visual observation

☐ Concrete block

No. of blocks used _____

Sampling Results (please check):

☐ No zebra mussels found

☐ Zebra mussels present

If zebra mussels present, how many did you observe in total (all blocks combined)?

☐ One

☐ 2-10

☐ 11-50

☐ 51-100

☐ >100

Were the mussels: ☐ Alive? ☐ Dead? ☐ Both alive and dead?

Did you preserve any specimens in isopropyl (rubbing) alcohol? ☐ Yes ☐ No

Other Comments: _____

Please submit form to:

Stream Unit

Missouri Department of Conservation

PO Box 180

Jefferson City, MO 65102-0180

Phone: 573/ 522-4115 ext. 3169

Voice Mail: 800/781-1989

Fax: 573/526-0990

E-mail: streamteam@mdc.mo.gov

Or submit this form on-line at: www.mostreamteam.org